SENSITIVITY OF SOLUBLE IRON DEPOSITION TO SOIL MINERALOGY UNCERTAINTY

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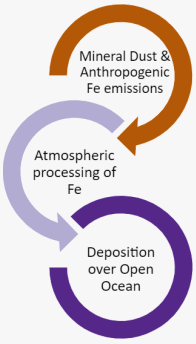
BACKGROUND & AIM

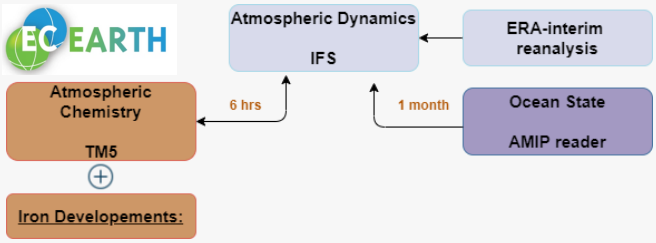


Ocean productivity relies upon bioavailable iron (Fe) as nutrient, which makes the **Fe biogeochemical cycle a key modulator of the ocean's ability to uptake atmospheric CO2.**

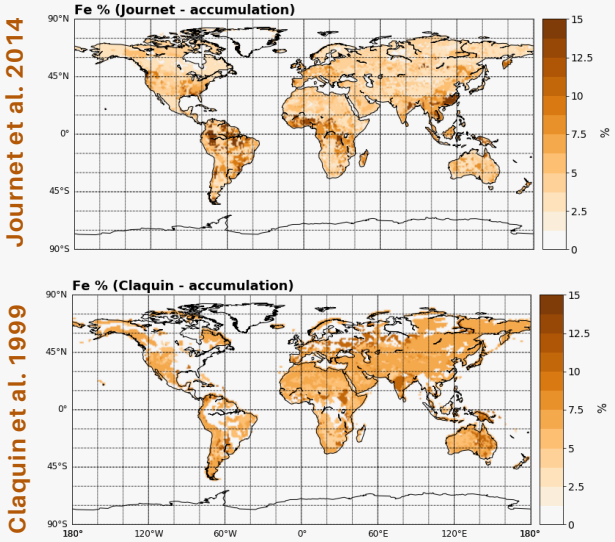
The **main external input of Fe to the open ocean surface is atmospheric deposition**, which derive mainly from soil dust aerosol transported from arid and semi-arid regions (~95%). Fe in freshly emitted soil dust is mostly insoluble, but it is hypothesized to be partly transformed into bioavailable Fe species during atmospheric transport through a variety of dissolution mechanisms.

In this work, **we assess the implications of soil mineralogy uncertainties on bio-available Fe delivery** to the open ocean by using a state-of-the-art ESM, EC-Earthv3, where a detailed atmospheric Fe cycle and two different data sets that characterize the soil composition over dusty areas have been implemented

MODEL DESCRIPTION & EXPERIMENTAL SETUP



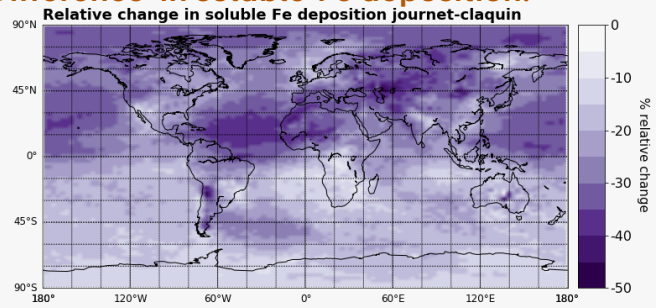
1. Fe Primary emissions associated with mineral dust and combustion aerosols.
2. Atmospheric processing mechanism of Fe :
   - Acidic dissolution
   - Oxalate-promoted Fe dissolution
   - Photo-reductive dissolution.
3. The representation of dust mineralogical composition - **two different soil mineralogy datasets:**



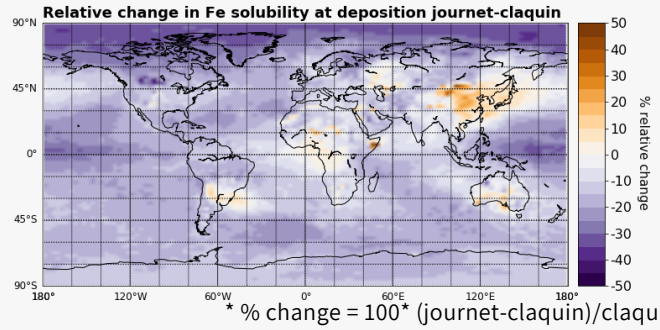
We run two equivalent 1-yr-long simulations with the two soil mineralogy datasets for the year 2011

RESULTS

Difference* in soluble-Fe deposition:



Difference in Fe solubility**at deposition:



* % change = 100* (journet-claquin)/claquin

** Fe-solubity = 100* Soluble-Fe/Total-Fe

CONCLUSIONS & FUTURE WORK

Our results show a **large sensitivity of the soluble Fe deposition to the choice of the soil mineralogy atlases,** with **differences up to 50%** downwind of major dust source regions such as North Africa. Overall, **soluble Fe deposition is larger when the Claquin dataset is applied,** particularly in the NH. However, **Journet mineralogy derives in higher solubility values for some regions,** e.g. East Asia and areas of the SH.

The **next steps in this work will include exploring how mineralogy affects the Fe-solubilization mechanisms,** e.g. by influencing atmospheric acidity

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FORCeS

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